

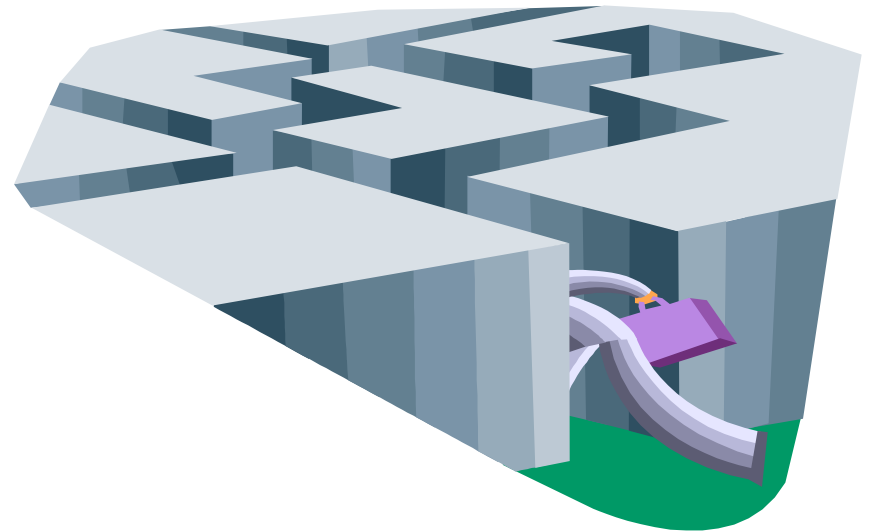
Electric Bills

What they tell you!

Brett Ward
Municipal Technical Advisory Service
Institute for Public Service
The University of Tennessee

Every trip has a beginning

- With Electrical Energy Management it begins with your current electric bill.



Electric Bill Information

- Simple Bill
 - Minimal Information
 - Perhaps only Dollar Amounts
- Complex Billing Statement
 - Details of Money
 - Current charges or minimum charges
 - Details of Electrical Usage
 - Energy Used- kWh
 - Rate it was used- kW- Demand
 - Way it was used- kW/kVA-Power Factor

Sample Statements

Simple Bill

NO RETURN TOP PORTION IF PAYING BY MAIL

COUNT NUMBER	510
CUSTOMER NAME SERVICE ADDRESS	
METER READING DATE	AUG 10 2007
DAYS BILLED	30

This office is not responsible for bills or payments lost in the mail. Previous balances added to this bill is past due and is subject to disconnection if not paid by final notice date shown above.

DEMAND OR	PRESNT READING	PREVIOUS READING	AMOUNT USED	AMOUNT
ELECTRIC (KILOWATT HOURS)	34312	32558	35000	3,018.97
OUTDOOR LIGHT			210	20.43
OPERATION POCKET CHANGE				82.43
VA FUEL COST ADJ				
FA				
TOTAL CURRENT CHARGES				3,070.00

PAID
AUG 30 2007

AMOUNT FROM PREVIOUS BILL	DATE CHARGES PAID	PAYMENTS & ADJUSTMENTS	PAID TO	BALANCE FORWARD (DISCOUNT FORWARDED)	CURRENT CHARGE	TOTAL
2,802.00	.00	2,802.00	.00	.00	3,070.00	3,070.00

DEMAND 109.7
POCKET CHRG YTD 4.18

COMPARE YOUR USAGE

PERIOD	DAYS	ELECTRIC KWH USED	DAILY AVG KWH
CURRENT	30	35000	1166.7
LAST MONTH	29	28765	991.7
YEAR AGO	31	26240	846.4

Detailed Statement

FIRM NAME: CT/RTE/ACCT/TH RATE: 157 65A2 CL 50

READING DATA: 34312 - DATE: 08/10/77
KWH PRS RDG: 32558 = REV. MD. 08 1754 X 20.000 = 35080.0 KWH

KM METER READING: 5-445 (CONSTANT = 20.000) COMPUTED = 129.000 KWH
KVA METER READING: 6-453 (CONSTANT = 20.000) COMPUTED = 129.060 KVA
BILLED 85% OF KVR = 109.701
POWER FACTOR = 84.400%

CONTRACT DEMAND = 000 HIGHEST BILLING DEMAND = 178.636
PREVIOUS 12 MOS = 178.636 LATEST 12 MOS = 178.636

DETERMINATION OF CURRENT MONTH BILLING DEMAND:
(1) HIGHER OF (1) OR (2) OR (3):
(2) METERED KW = 109.701
(3) 100% OF FIRST 5000 + .75 OVER 5000 = 109.701
(3) .30 * HIGHER OF CNTR KW OR PREV HI KW = 53.991
BILLING DEMAND = 109.701

CUSTOMER CHARGE
ENERGY CHARGES
15000.000 KWH @ \$-08369 \$-1255.35
20000.000 KWH @ \$-08199 \$-1639.80
TOTAL ENERGY CHARGE \$-2895.15
DEMAND CHARGES
50.000 KW @ \$-00000 \$-0000.00
59.701 KW @ \$-13.79000 \$-821.34
TOTAL DEMAND CHARGES \$-821.34

TOTAL RATE SCHEDULE REVENUE \$-3,049.19

MINIMUM BILL CALCULATION:
(1) (A) CUSTOMER CHARGES \$22.00
(B) HI OF CNTR OR PRV HI KW X .20 X OVER 50 KW PRICES \$509.47
178.636 KW @ .20 X (\$13.790 + ADD \$-470) \$531.47
= TOTAL \$531.47

TOTAL MONTHLY RATE SCHEDULE REVENUE \$-3,049.19

SALES TAX @ 0.000 % \$-00.00
TOTAL \$-3,049.19

OUTDOOR LIGHT CHARGE \$-20.43
SALES TAX @ 0.000 % \$-00.00
TOTAL \$-20.43

TOTAL BILLING CHARGES \$-3,069.62
MISCELLANEOUS CHARGE \$-00.00
TOTAL WITH LOAN \$-3,070.00

First Challenge

- Find the Local Power Company representative who can thoroughly explain the detailed statement
 - Front line Customer Service have a “script”
 - Highly Technical Culture
 - Many terms, abbreviations, and acronyms
 - Person who knows the details may not be customer service oriented

Detailed Statement

Meter Readings in kWh

Note Constant

Demand Reading in kW

#1 Demand Reading in kVA

#2 Demand billed @ 85% of kVA

Power Factor is 84.4%

~Contract Demand

Highest Billing Demand (12 months)

#3 Demand 30% , highest 12 mo. Dmd

Demand Billed on 109.7 kW

Customer Charge

Energy Costs

1st 15,000 kWh + FCA

Remaining 20080 kWh

Demand Charges

1st 50 kW no charge

Remaining 59.7 kW +

Minimum Demand

FIRM NAME:

CT/RTE/ACCT/TN
RATE: 157 6SA2

CL 50

READING DATA: DATE: 08/10/7
KWH PRS RDG: 34312 - PRV RDG: 32558 =
KW METER READING: 5.445 (CONSTANT =
KVA METER READING: 6.453 (CONSTANT =
REV. MD. 08
1754 X 20.000 = 35080.0 KWH
20.000) COMPUTED = 108.900 KW
20.000) COMPUTED = 129.060 KVA
BILLED 85% OF KVA = 109.701
POWER FACTOR = 84.400%

CONTRACT DEMAND
0.000

HIGHEST BILLING DEMAND
PRECEDING 12 MDS. 178.636
LATEST 12 MDS. 178.636

DETERMINATION OF CURRENT MONTH BILLING DEMAND:
HIGHER OF (1) OR (2) OR (3):

(1) METERED KW = 108.900
(2) KVA @ .85 OF FIRST 5000 + .95 OVER 5000 109.701
(3) .30 * HIGHER OF CNTR KW OR PREV HI KW 53.591

BILLING DEMAND : 109.701

CUSTOMER CHARGE

ENERGY CHARGES:
15000.000 KWH @ \$.08369 \$.00353 .00093 = \$1322.25
20080.000 KWH @ \$.03961 \$.00199 .00091 = \$853.60

TOTAL ENERGY CHARGE

DEMAND CHARGES:
50.000 KW @ \$.00000 \$.00000 .00000 = \$.00
59.701 KW @ \$13.79000 \$.47000 .00000 = \$851.34

TOTAL DEMAND CHARGES

TOTAL RATE SCHEDULE REVENUE

MINIMUM BILL CALCULATIONS:

(1) (A) CUSTOMER CHARGE: \$22.00
+ (B) HI OF CNTR OR PRV HI KW X .20 X OVER 50 KW PRICE: \$509.47
178.636 KW @ .20 X (\$13.790 + ADD \$.470)
= TOTAL \$531.47*

TOTAL MONTHLY RATE SCHEDULE REVENUE

SALES TAX @ 0.000 %

TOTAL EL

OUTDOOR LIGHT CHARGE

SALES TAX @ 0.000 %

TOTAL OL

TOTAL BILLING CHARGES
MISCELLANEOUS CHARGE

TOTAL WITH LOAN

CHARGES
22.00

2,175.85

851.34

3,049.19 *

\$22.00

\$509.47

\$531.47*

3,049.19 *

.00

3,049.19 *

20.43

.00

20.43 *

3,069.62 *

MU

.38

3,070.00 *

Saving Money

1. Use less kWh
2. Keep Power Factor >85%
3. Minimize Demand Charges

FIRM NAME: CT/RTE/ACCT/TN
RATE: 157 GSA2 CL 50

READING DATA: DATE: 08/10/77
KWH PRS RDG: 34312 - PRV RDG: 32558 = REV. MD: 08
1754 X 20.000 = 35080.0 KWH

KW METER READING: 5.445 (CONSTANT = 20.000) COMPUTED = 108.900 KW
KVA METER READING: 6.453 (CONSTANT = 20.000) COMPUTED = 129.060 KVA
BILLED 85% OF KVA = 109.701
POWER FACTOR = 84.400%

CONTRACT DEMAND .000 HIGHEST BILLING DEMAND
PRECEDING 12 MOS. 178.636
LATEST 12 MOS. 178.636

DETERMINATION OF CURRENT MONTH BILLING DEMAND:
HIGHER OF (1) OR (2) OR (3):
(1) METERED KW = 108.900
(2) KVA @ .85 OF FIRST 5000 + .95 OVER 5000 = 109.701
(3) .30 * HIGHER OF CNTR KW OR PREV HI KW = 53.591

BILLING DEMAND : 109.701

CUSTOMER CHARGE
ENERGY CHARGES:
15000.000 KWH @ \$.08369 \$.00353 .00093 = \$1322.25
20080.000 KWH @ \$.03961 \$.00199 .00091 = \$853.60
TOTAL ENERGY CHARGE \$2175.85

DEMAND CHARGES:
50.000 KW @ \$.00000 \$.00000 .00000 = \$.00
59.701 KW @ \$13.79000 \$.47000 .00000 = \$851.34
TOTAL DEMAND CHARGES \$851.34

TOTAL RATE SCHEDULE REVENUE \$3,027.19 *

MINIMUM BILL CALCULATION:
(1) (A) CUSTOMER CHARGE: \$22.00
+ (B) HI OF CNTR OR PRV HI KW X .20 X OVER 30 KW PRICE: \$509.47
= TOTAL \$531.47*

TOTAL MONTHLY RATE SCHEDULE REVENUE \$3,049.19 *

SALES TAX @ 0.000 % .00

TOTAL EL \$3,049.19 *

OUTDOOR LIGHT CHARGE 20.43
SALES TAX @ 0.000 % .00

TOTAL OL 20.43 *

TOTAL BILLING CHARGES \$3,069.62 *

MISCELLANEOUS CHARGE .36

TOTAL WITH LOAN \$3,070.00 *

Use Less Energy or kWh

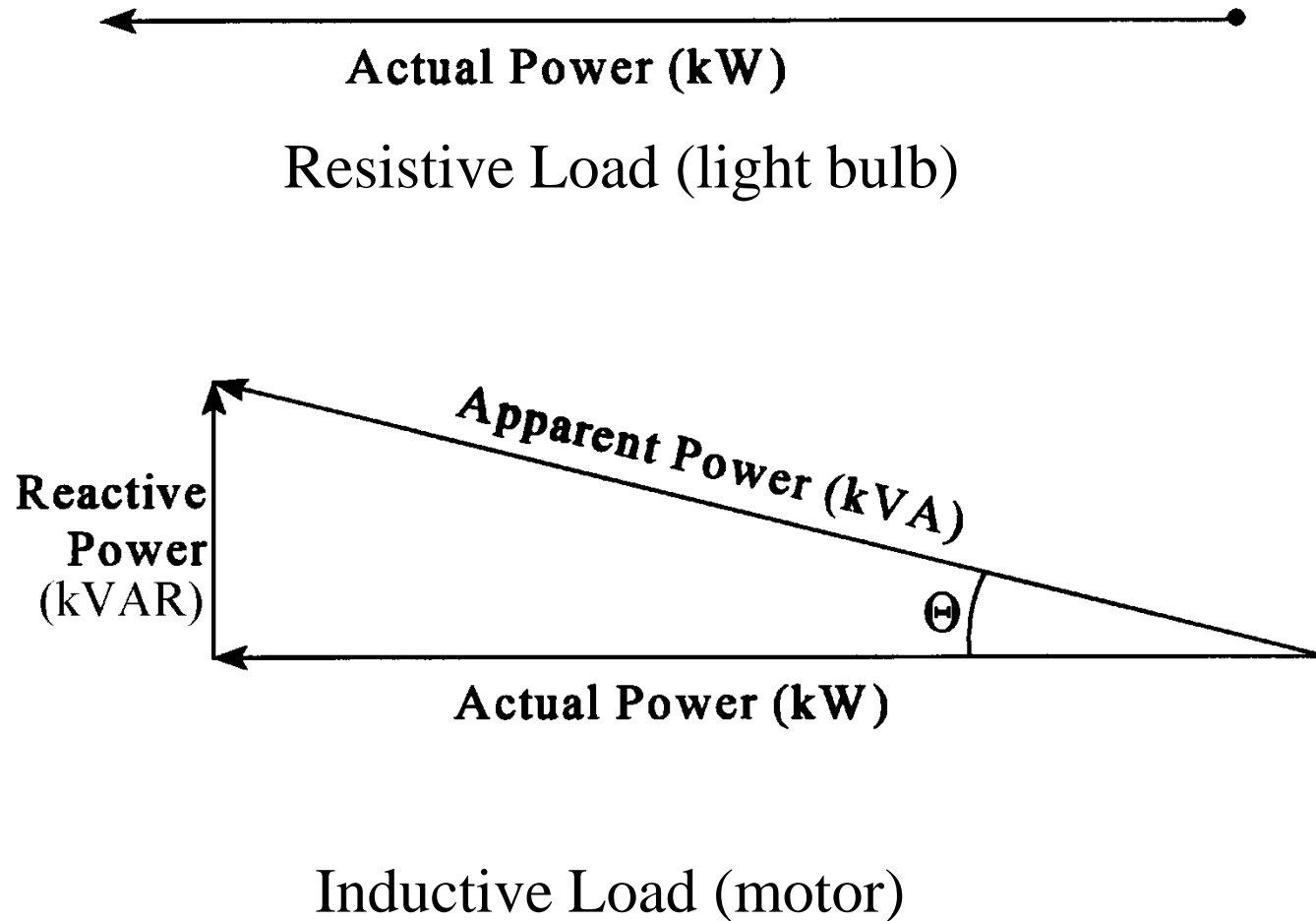
- Turn stuff OFF!
 - Don't over aerate
 - Do not discharge Nitrate (NO_3)
 - If you Nitrify, Denitrify Effluent and Sludge or Biosolids
 - Lots of other actions
 - Improve efficiency and reduce waste
- Generate your own kWh

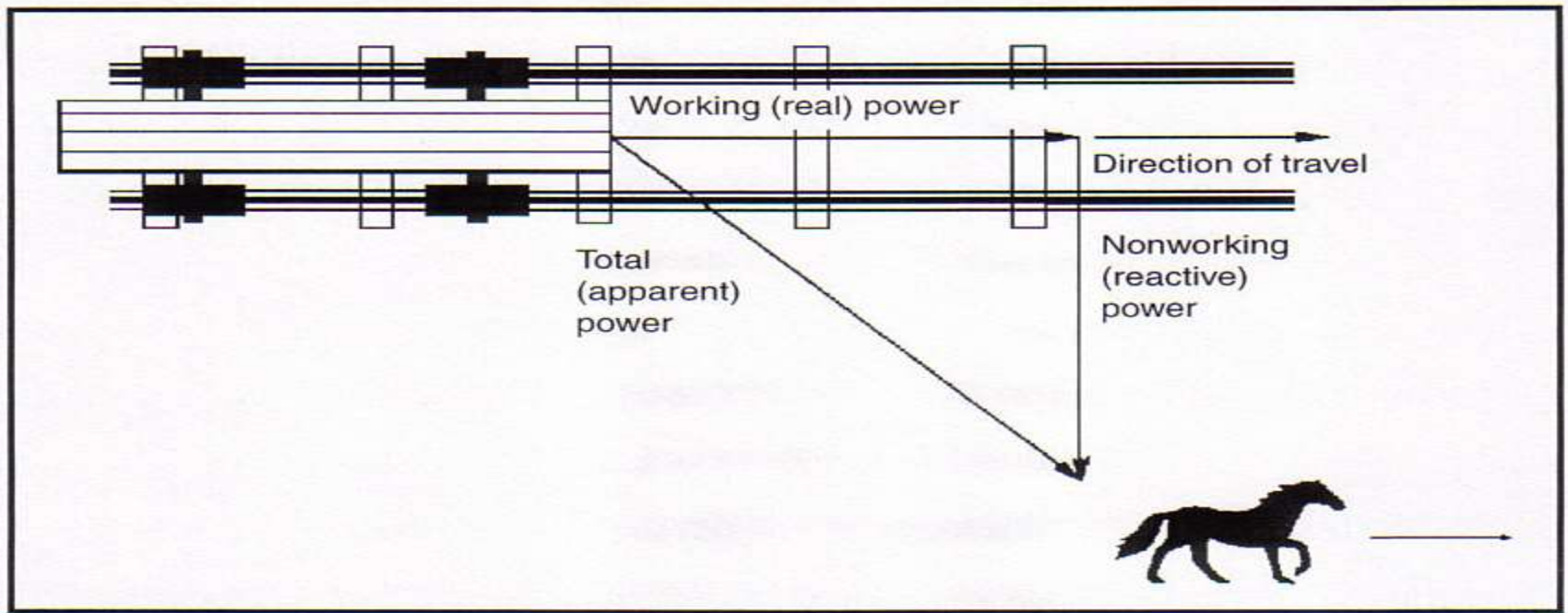
Power Factor Penalties

Reactive Energy Management

- Keep Power Factor above 85%
- Distributors generally will help you
- Reduce inductive load
 - Inductive motors, ballasts, arc welders, transformers, loads with wound coils, idling or lightly loaded motors
 - Add capacitors- whole plant or single motor
- Improves electrical efficiency of the system

Power Factor Triangle





Power required to move the railcar down the track is the working (real) power

The effort of the horse is the total (apparent) power

The car will not move sideways; not all of the horses effort is used to move the car down the track

The sideways pull of the horse is wasted effort, nonworking (reactive) power.

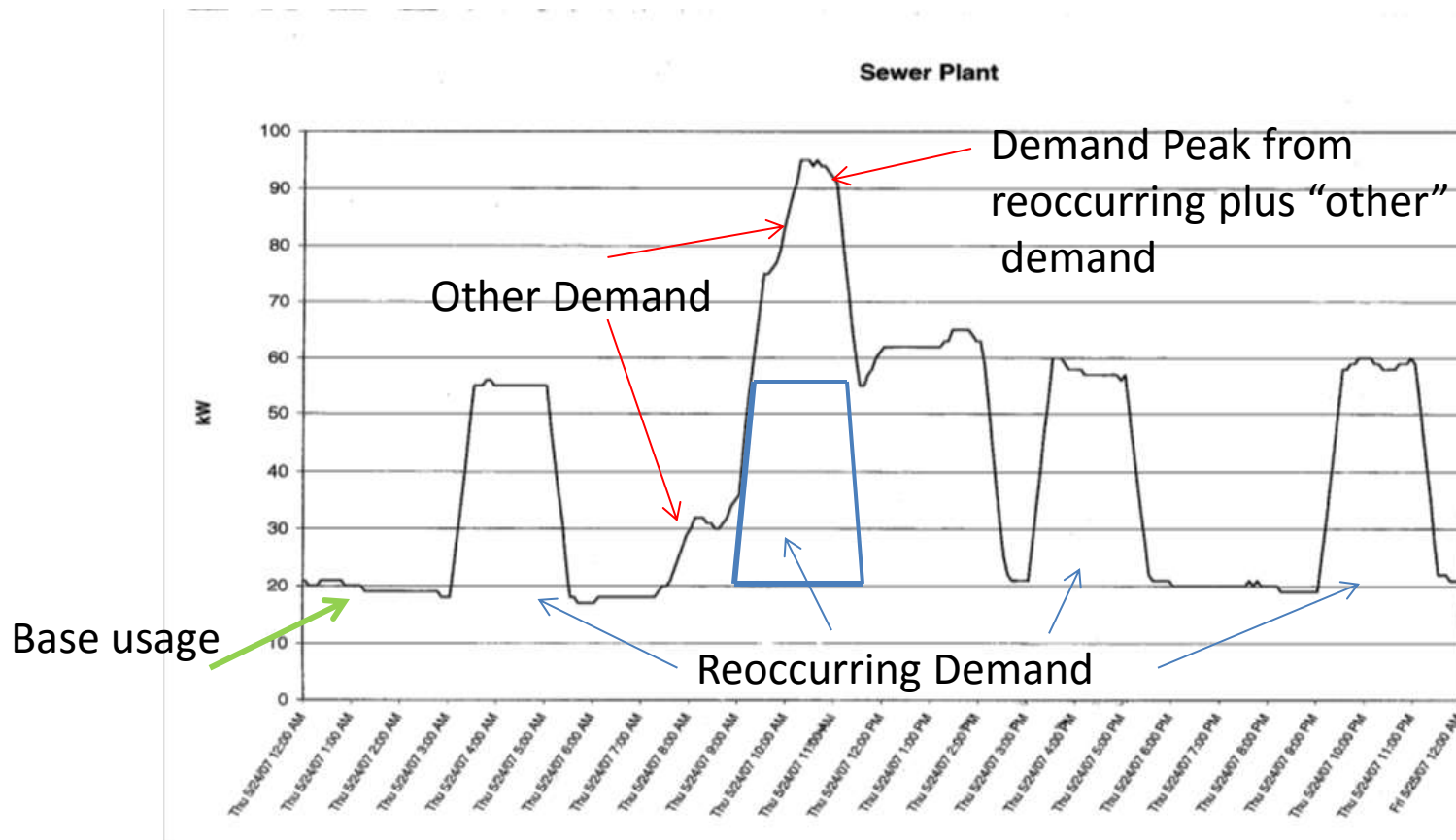
Power Factor

- Idling or lightly loaded motors
 - Screw Lift Pumps
 - Some Blowers, near empty digester
- Adjustable Speed Drives- at low speeds some types have very low Power Factor, (70%)
 - Three types: variable voltage inverter, current source inverter, & pulse width modulation
 - VVI & CSI drives have lower Power Factor at low speed but are marginally more efficient at low speed and less costly to purchase than the PWM drive

Reduce Demand Charges

- Know Thy Demand
- Demand Curve, Graph, Chart
- Reduce Demand Peaks that set the kW peaks from which charges are assessed.
- Keep it FLAT, keep it Short

Example Demand Graph



Contract Charges

- Contract Charges
 - Know and understand any contract minimum charges, probable from construction charges
- Minimum Demand
 - Annual Peak Demand

FIRM NAME: CT/RTE/ACCT/TN
RATE: 157 GSA2 cL 50

READING DATA: KWH PRS RDG: 34312 - PRV RDG: 32558 = DATE: 08/10/77 REV. NO. 08
1794 X 20.000 = 35080.0 KWH

KW METER READING: 5.445 (CONSTANT = 20.000) COMPUTED = 108.900 KW
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POWER FACTOR = 84.400%

CONTRACT DEMAND .000 HIGHEST BILLING DEMAND PRECEDING 12 MOS. 178.636
LATEST 12 MOS. 178.636

DETERMINATION OF CURRENT MONTH BILLING DEMAND:
HIGHER OF (1) OR (2) OR (3):
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(2) KVA @ .85 OF FIRST 5000 + .95 OVER 5000 109.701
(3) .30 * HIGHER OF CNTR KW OR PREV HI KW 53.591

BILLING DEMAND : 109.701

CUSTOMER CHARGE ENERGY CHARGES:
15000.000 KWH @ \$1.08369 \$1.00353 .00093 = \$1322.25
20080.000 KWH @ \$1.03961 \$1.00199 .00091 = \$1853.60
TOTAL ENERGY CHARGE 2,175.85

DEMAND CHARGES:
50.000 KW @ \$1.00000 \$1.00000 .00000 = \$1.00
59.701 KW @ \$13.79000 \$1.47000 .00000 = \$851.34
TOTAL DEMAND CHARGES 851.34

TOTAL RATE SCHEDULE REVENUE 3,049.19

MINIMUM BILL CALCULATION:
(1) (A) CUSTOMER CHARGE: \$22.00
+ (B) HI OF CNTR OR PRV HI KW X .20 X OVER 50 KW PRICE: \$509.47
= TOTAL \$531.47

TOTAL MONTHLY RATE SCHEDULE REVENUE 3,049.19

SALES TAX @ 0.000 % .00

TOTAL EL 3,049.19

OUTDOOR LIGHT CHARGE 20.43
SALES TAX @ 0.000 % .00

TOTAL OL 20.43

TOTAL BILLING CHARGES 3,069.62
MISCELLANEOUS CHARGE .38

TOTAL WITH LOAN 3,070.00

Electric Bill Information

- Energy usage kWh
- Rate of usage
 - Demand
 - kW
- How its used
 - Power Factor shows inductive or capacitive load
- Contract Minimums



Other Types of Charges or Rates

- On/Off Peak Rates
 - Energy- kWh
 - Demand- kW
- Seasonal Rates
- Transmission
- Distribution
 - Delivery Charge
 - Administration Charge
 - Transition Adjustment
 - Bill Credit
 - System Benefit Charge
 - Revenue Decoupling
 - State Assessments
- Other Rates
 - Baseline Utilization
 - Income Qualifications
 - Medical Discounts
 - Residential: Peak/Off Peak
 - Residential: Weekday/end
- Electric Vehicle Options
- Generation sellback rates

Questions or Comments

